Technical Report of an oak/shortleaf pine stand restoration plan for the Wayne National Forest, compartment 407, stand 10

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Abstract

Purpose and Need:

The Morgantown Field Office (MFO) received a request from the Ironton Ranger District, located in the Wayne National Forest (WNF), to evaluate a 40 acre timber stand for insect and disease vectors. The request originated from District Forest Management team leader Chad Fitton, who is completing a silviculturist license with a harvest prescription for a timber stand. We are assisting with recommendations and considerations of insect and disease vectors that may impact the shortleaf pine (*Pinus echinata*) and oak (*Quercus sp*.) prescription he has written for stand 10, compartment 407.

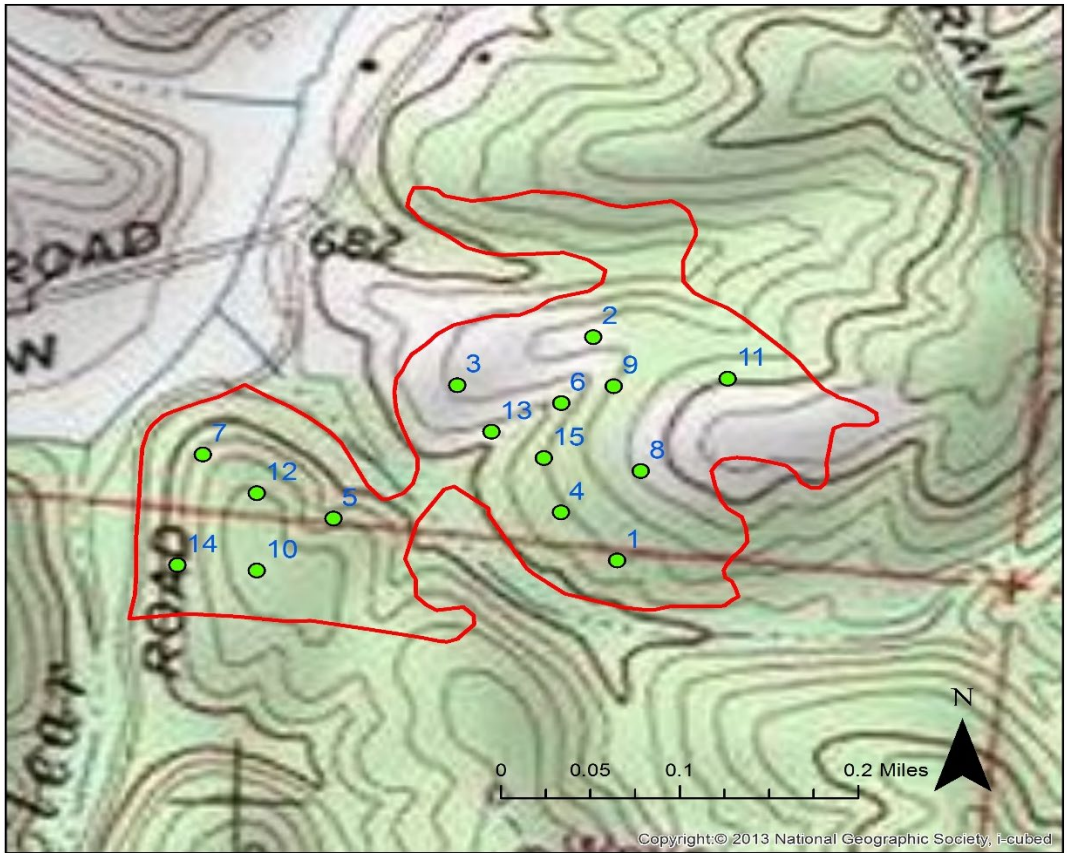
Currently the stand consists of mixed pine and hardwood species. There have been observations of stressed and dying shortleaf pine within the stand. The cause of this stress should be investigated, to determine whether or not biotic factors such as insects and diseases are causing stress or abiotic factors such as soil nutrients or climatic conditions are the cause. Understanding these factors will assist in the decision of species regeneration in the stand prescription.

Project Location/Description

The Wayne National Forest (WNF) is situated in the hills of southeastern Ohio and consists of approximately 250 thousand acres of land divided into three units. The project stand (38.837876,-82.540171) is located in the Ironton ranger district, 4.1 miles southeast of Oak Hill. This stand is approximately 40 acres in size and is a hardwood/pine forest type. The understory growth consists of mainly red maple (Acer rubrum), American beech (Fagus grandifolia), american hornbeam (Carpinus carolinensis), white oak (Quercus alba) and black oak (Quercus velutina) and hickory (Carya sp.). The overstory is mainly composed of shortleaf pine (Pinus echinata), Virginia pine (Pinus virginiana), red maple (Acer rubrum), yellow poplar (*Liriodendron tulipifera*), black cherry (*Prunus serotine*) and shagbark hickory (*Carya ovata*).

This stand was once part of an analysis area called the Buckeye project that was cancelled due to public concerns following the NEPA analysis phase. The objective of the silvicultural prescription is to create a shortleaf pine-oak stand composition.

Species Evaluation/Background



Objectives

The objectives for this evaluation were to 1) determine ???, 2) assess the location and health of ???, and 3) determine the need for ??? treatments to protect and maintain the ??? resources.

Methods

A crew from the Morgantown field office visited the stand in the Wayne National Forest on 12 December 2016. Using a metal detector and GPS coordinates of the plot locations we re-monumented the plot centers with 5 foot rebar marked with orange flagging, numbered bronze tags, and stake chasers at the base of the rebar. We then measured the live crown ratio (LCR) of all of the shortleaf (Pinus echinata), pitch pine (Pinus rigida), and Virginia pine (pinus virginiana) in the plot, using the LCR measurement card (To find LCR two technicians walk far enough away from the tree in order to compare the marks on the card with the length of the entire tree. The trees were considered “in” the plot using a 10 factor prism.

To monitor for insects in the stand we have placed four Lindgren funnel traps in close proximity to site 2, where tree mortality has occurred. We are using the Forest Service Early Detection Rapid Response (EDRR) protocol to set these traps. These traps will be baited with alcohol lures and brevacomin pheromones to attract nearby bark beetles. The traps use propylene

glycol (Napa® Marine and RV antifreeze) in the collection cup to capture and preserve baited insects. Samples should be collected and lures replaced on a bi-weekly basis in order to maximize effectiveness of the traps. Trapping will begin in early spring when the bud break for dogwood and mountain laurel occur.

Determining whether or not the shortleaf pine mortality was caused by insect activity will be accomplished by attempting to rear beetles from sections of the dead tree. The tree was felled and bucked into 20 inch pieces and cut down the center. These sections were placed in 50 gallon barrels. The lids of these barrels were replaced with fine mesh Lumite® screen to regulate oxygen and air flow for potential beetle larvae. The barrels were then brought back to the MFO where they were stored in our outdoor rearing shelter. The barrels will be monitored until the end of the summer of 2017, at which time the bark will be stripped and the cambium layer inspected for signs of deceased larvae or larval activity.

Invasive Species

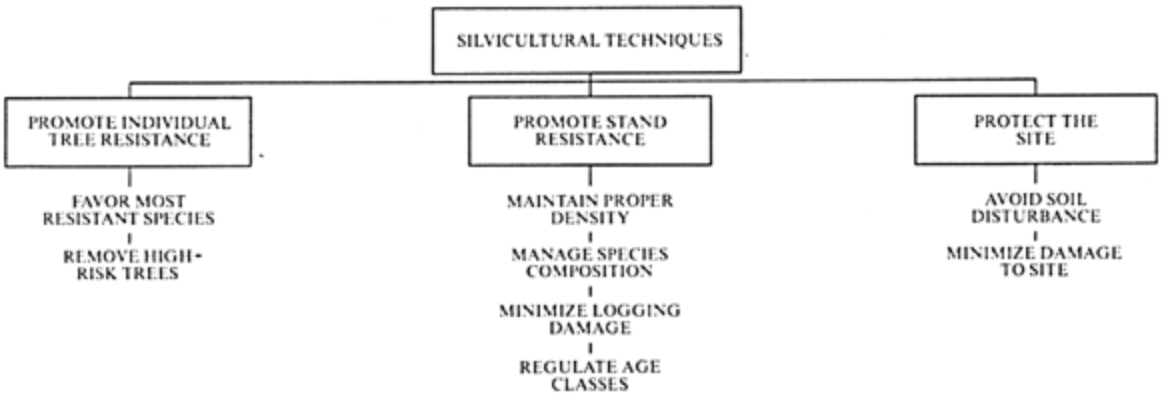
Results

Live Crown ratio

The live crown ratio for the plots ranged from 10% to 40% and the mean LCR for the plots was 25%. A study by Baker and Shelton (1998) of suppressed southern pines show a relationship between LCR, DBH and height. Suppressed pines with an LCR > 20% exhibited increasing diameter and height growth rates after a crown release was conducted.

Southern Pine Beetle (*Dendroctonus frontalis*)

Southern pine beetle (SPB) is a destructive forest pest that prefers shortleaf, pitch and Virginia pine species. The proper silvicultural techniques (Figure 1.) can help prevent the attack and spread and population growth of the forest pest (Belanger 2006). SPB has not yet been confirmed in the stand, however has been confirmed to be in the Wayne National Forest. Monitoring has been implemented in the stand and the results will be provided in a separate note at the end of the summer of 2017.



Ips engraver beetles (*Ips sp.*)

This pine bark beetle genus is a frequent pest of stressed pines in the southern United States. These beetles live predominately in the inner bark, where they breed and feed on the phloem tissue (

Preventative strategies in forest stands include:

- planting species that are appropriate to the site,
- thinning dense, overstocked stands,
- conducting prescribed burns or other treatments to control competing understory vegetation,
- removing and/or salvaging damaged, declining, or recently-dead trees,
- avoiding damage to residual stand when conducting management operations, and
- lopping and scattering or removing logging slash.

Gypsy Moth (*Lymantria dispar*)

A gypsy moth infestation in future oak/ short leaf pine stand is a concern, however at the moment the pest is not in the area. It is not clear at the moment, according to David Atkins, the Agriculture inspection manager/ Gypsy moth program manager for the Ohio Department of Agriculture, exactly how soon the location would be generally infested with gypsy moth. According to recent data the spread has generally been 5.3 or 3.3 miles per year over the last 28 years. However the closest infestation in Ohio, that is 128 km or 79 miles away has an average spread and -6.45 km or -4.03 miles per year over the past 17 years. With this in mind it is believed that gypsy moth could take 24 or more years to reach this location (Personal communications with David Adkins Ohio Department of Agriculture, Gyspy Moth Program Manager).

Stand susceptibility is defined as the probability of defoliation by the gypsy moth given its presence. Characteristics of a susceptible stand include; large number of favored food species, abundant refuges for larvae, and sparse litter protection and unfavorable habitat for small mammal predators. A means of rating a susceptibly stand have been outlined in Herrick and Gasner (1986), using species composition, tree size and average tree condition. Species composition is the greatest factor in determining the susceptibility of a stand. Certain species are immune or resistant to larval defoliation (Red maple, black cherry, yellow poplar, pitch pine) while others are more susceptible (Oak sp., paper birch, basswood). A stand with higher composition of susceptible species like black oak, chestnut oak, scarlet oak, norther red oak and white oak, is not recommended. In oak/pine stands, when oak is higher than 40 to 50 percent of the stand it is considered to have a high susceptibility.

Invasive woody plant species present in the stand:

In December of 2016 two non-native, invasive woody species were observed in the stand: *Lonicera japonica,* Japanese honeysuckle; and *Rosa multiflora*, Multiflora rose. It is important to address these species as they are difficult to control once established in the forest. Each of these woody species is aggressively growing, potentially outcompeting new seedlings and other native vegetation for resources and ultimately replacing them in the landscape. Where gaps occur in the canopy due to forest treatments and bare soil is exposed, these species take advantage of sunlight and can establish quickly, forming large thickets that are impenetrable to sunlight. Eventually any new tree seedlings can die off due to lack of sufficient sunlight and inability to compete with these aggressive non-natives. Herbicide use and mechanical methods are effective against the infestations and protect the native species at the same time. Further investigation into the stand in late spring or summer will reveal other non-native invasive species that are present there or nearby that could also pose a threat to the diversity of species and regeneration of desired native woody species there.

Control recommendations by each species:

Lonicera japonica:

Japanese honeysuckle is a non-native, invasive vine that climbs and attaches itself to saplings and other shrubs, uses them for support, blocks them from sunlight, girdles and can kill them. This species can dominate and take over in forests that are in early successional stages or when gaps are created from thinning. The seeds are bird- and small animal-dispersed and do remain in the seedbank. These vines can take over (block sunlight) and eventually kill even mature trees.

For the small patches, plants can be hand pulled by holding close to the ground (best when soil is moist) and pulling up in order to remove the roots as well. Areas would need to be re-checked to remove new plants if they arise. For larger patches, herbicide application would be necessary at least once during the growing season in August or September. A second application during the same growing season might be needed for even denser populations.

Burning will kill off plants but regeneration is likely due to the soil seedbank and increased sunlight on the bare ground (newly disturbed due to the stand treatments) encouraging new germinants.

Post-treatment monitoring would be best for treatment of any new establishments.

Rosa multiflora:

Multiflora rose is a non-native, invasive, arching shrub that grows vigorously, forms thickets (replacing other native shrub and herbaceous species), and produces large amounts of hips (fruits) that are spread by birds. Hundreds of seeds are produced by one plant and remain in the soil for many years.

Herbicide application should occur in spring to early summer. Denser populations can be mowed repeatedly during the growing season. A combination of the two methods can be very useful. Also, cut stumps of the plant can be painted with herbicide in the fall when the plant is moving resources to its roots (making sure herbicide doesn't drip down stem and leach into soil possibly affecting other non-target species) – might work well in a natural forest setting so that habitat disturbance is not severe. Herbicide painting can be done when the plant is dormant as well. A combination of mowing or cutting **immediately** followed by herbicide painting has been highly recommended as effective for killing these plants.

Burning will curb an infestation but soil seedbank may remain and resprouting can occur due to root suckering.

Post-treatment monitoring is necessary to detect and treat new infestations.

Disease

Little leaf disease (*Phytopthera cinnomomi*)

Soil samples were cultured using a forest health protection standard sampling and culturing protocol. The soil samples were collected during the months of October 2016. The samples were baited using rhododendron leaves and left to culture over several weeks in a *phytophtera* specific media. The results from this test were negative for *phytophtera* fungal spores. This test has a high success rate of *phytophtera* detection, however no test is 100% accurate due to varying conditions of soil temperature and distribution of pathogens on the site

Discussion

Treatments and Management Alternatives

Recommendations

Option 1 Thinning with natural regeneration

Option 2 Thinning with planting

Option 3- No Action

The third alternative involves no action at all. This action will likely lead to the stand converting to a red maple and beech dominated forest.

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Appendix A

Appendix B